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OUR BOYS AT SCHOOL.

BY RICHARD A. PROCTOR.

THE death of one of the boys at King's College School, through ill-treatment by his fellows, will probably have been inquired into fully, and the matter disposed of, before these lines are read. But in any case my remarks will be general, and such as could be properly made while the matter is still *sub judice*.

It appears to me that the question of school discipline is one which needs very careful study in Great Britain. If there is one article of national faith which the Briton of the top-boot type regards as sacred, it is that our public schools are noble institutions where the best and bravest types of British manhood were formed. It has always seemed to me, however, that if our public school system fails to turn any boy subjected into a cross between the bully and the sneak, it can only be because the boy has a singularly good disposition by nature, and because his school has fortunately been under the control of an exceptionally strong and able ruler. Many talk as though such work as Arnold and Temple did at Rugby had been done once and for ever—as though bullying had been killed because it was scotched there and then. Unfortunately, this is far from being the case. Bullying is literally *encouraged* by our public school system, just as slavery was encouraged of old in America. It is made worth a boy's while to become a bully as soon as he can escape being bullied. If he is of too good a nature to learn the art of bullying, he comes off worse than boys of coarser disposition. If a head-master can make bullies wretched by developing a brave and manly tone, the mischief may for a while be checked, or even stopped altogether. But the evil of the system remains.

This is a serious matter. Fathers of families commit their boys, at a time when as yet the character is unformed, to emphatically evil influences. Unfortunately, they have scarce any choice in the matter. As social and business life is constituted, and must be constituted, in all busy communities, a man cannot take charge or even watch over the education of his boys. Then boys cannot be properly trained for the struggle of life at home, or even, perhaps, as private pupils, "where only a limited number can be received," an arrangement which is often as disastrous in its results as public school training can be. A man has to send his boys either to a public school or to some private school, which may or may not be a good one.

What we want is an overhauling of the whole system of our public schools, and indeed of all our schools. The savage idea underlying the working part of the system, the idea that the best sort of training for boys is that by which the qualities of a bull-dog, or of that sweet creature the Tasmanian devil, may be most thoroughly developed, should have died out long since. It belongs to the days when we were savages, when, perhaps, had we not been savages, we should have been wiped out of existence—the good old times of the Tudors which the modern survivals of savagery, the Jingoes and top-boot Tories, regard as England's best days. It will be held in future ages as a perfect marvel of idiotic conservatism that England should have retained to the last quarter of the nineteenth century a school-system fit only for the rearing of buccaneers and horse-thieves.

The vital defect of our school system is that it leaves the weakest to go to the wall. Every boy who passes through the course of training involved in the system must be for a time among the victims of this injustice; and nearly every such boy has to pass through the yet severer ordeal of being for a while possessed of power over fresh victims of this stupid and brutal system. "Is there any man living," says one who has passed through both parts of the school discipline, "is there any man living who has ever been to a public school, who can place his hand on his heart and say that at one time or another his school life was not *a hell upon earth?*" Strong words, but not one whit too strong. Every form of fiendish cruelty is practised by school bullies on their wretched victims. Not only so, but evil is developed by example, and even by precept, while good is discouraged. The boys of best disposition among the elders are for the most part silent, partly because they are outnumbered, and partly because in all communities evil is always louder and more prominent than good. A boy must be far above the average to escape the evil influence of bad example and brutal bullying while he is one of the weak: the chances are great that he will be himself a brutal bully, and in other ways set an evil example, when he has become one of the strong.

It may be urged that a large proportion of our best men have been brought up at public schools. Let it be granted. But even if all our worthiest had been so reared, that would prove nothing; for nearly all those who have any chance of high distinction must—for want of better—go to a public school. The argument is like that absurd reasoning in favour of studying two dead languages by way of preparation for life's struggle, that many of England's greatest men have been well versed in classical lore, and could, perhaps, still turn a police-court trial into Greek Iambics when already high in the service of their country. How could such men help being well ahead, as boys, in the only subject given them to work at? If chess and whist had been the chief subjects of their school work, they would have been well ahead in gambits and the conduct of trumps. Our great men who have come out from public school life undefiled and unbrutalised have done so despite the inherent savagery of the public school system: their greatness has owed about as much to their school training as the colour of their hair. If any one of our statesmen who have been at public schools could lay his hand on his heart and say, "It was when I was kicked daily, or welted with a stump every cricket afternoon,

that my powers as a statesman were first unconsciously developed in me," or perhaps, contrariwise, "It was when I used to welt young Brown and Jones, holding them in slave-like obedience to my supreme will, that I first learned to control the fortunes of men and nations," then, indeed, we might form a different opinion (of him, if not of the school system). But no one acquainted with the real facts can for a moment doubt that our leading men have become great despite, and not because of, their public-school training.

But there is another aspect in which such brutalities as have recently been heard of may be viewed. It is singular how inapt many are to perceive the true meaning of boyish wickedness as developed at some schools. They talk of the misfortune that so many bad boys, cruel blackguardly louts, and so forth, should by chance have gone to such and such a school; and compare with the bad fortune of one school in this respect the good fortune of another, where the tone is so much braver and purer. Few seem to recognise the fact that a boy's nature is singularly plastic—in ninety-nine cases out of a hundred. It yields to surrounding influences—as the growing tree to the action of causes which when grown would produce little effect upon it. Where the boys of a school are bad, it is nearly always—nay, for my own part, I say "always"—because the influences to which they are exposed are evil; where the tone among the boys of a school is good, one may be well assured that they are under the influence of good men.

Oddly enough, I predicted, now nearly two years ago, the development of evil qualities at the very place where an unfortunate lad has been done to death. In an article on "Our Boys at School," which appeared in KNOWLEDGE for August 21, 1883, I called the attention of parents to the necessity of inquiring carefully whether the masters of schools where their boys were to go, had the qualities essential for the development of good feeling among the lads under their control. I named no names, but I was moved to write the article by the necessity which had, in my opinion, arisen for removing three boys of my own from King's College School. I recognised, in what my lads told me, clear evidence that the tone among the boys at the school was bad; and I knew that this can only be interpreted in one way. "If," I said, a parent finds, when talking the matter over with his boys, that "there are many 'mean fellows' among the boys, fellows who let others be punished for *their* offences, who cringe when they are not bullying, and bully when they are not cringing, be sure there is something wrong among the masters." Such evidence is far better than actual complaints of unfairness on the masters' part, for boys, like men, may complain without cause. But among a given number of boys there will always be a large proportion whose characters take their tone from the character of the masters; they will be among the good fellows if the masters help them that way; but they will sink into the ranks of the bad fellows (sneaks, bullies, and cowards) if the masters are of that kind.

I have in my thoughts two marked examples, each double in its significance, of the influence of good and bad masters, and especially of good and bad head-masters. In one case the tone in a school had been decidedly bad, many of the boys being bullies and cowards, selfish and treacherous. A new master (whom I have the pleasure of knowing well personally) replaced the master under whom the school had had this unpleasant character. Shortly after my own boys went to that school. They talk to this day with enthusiasm of the splendid tone prevailing there. The lads were neither bullies nor cowards, neither brutes nor sneaks—simply because the few boys who were really bad (some such there are in every gathering of boys) had their badness shamed out of them. The discipline was strict but just. Every boy knew what he had to expect, and was never disappointed, either in the way of reward or of punishment. At another school, of which I knew something, an excellent tone prevailed ten or twelve years ago. A change of masters came about, and now among the boys of that school brutality and meanness, vice and profanity (yet it is a professedly religious school, where all things are to be conducted *sancte et sapienter*) are rampant. The moral of this evidence should be obvious. The lesson it teaches is of vital importance—socially, morally, and nationally.—*Newcastle Daily Chronicle.*

MYSTERIES AND MORALITIES.

BY EDWARD CLODD.

I.

THE Revised Version of the Scriptures, now completed by the issue of the Old Testament, which seems somewhat in danger of being nicknamed the Caper-berry Bible,* is a recognition of the possible imperfections of the translations that have preceded it, as also of the uncertainty of meaning of the most ancient texts, the oldest of which are relatively modern, on comparison of which the *textus receptus* is based. The work of the revisers is, therefore, a distinct move in the direction of that more intelligent treatment of these venerable writings which will do more than theories concerning their divine authority to secure their abiding-place among the priceless records of human experience and spiritual development.

The revisers, who are presumably not influenced by commercial motives in their work, would have better shown their sense of its importance by issuing the complete version at such a price—say a few pence per copy—as would place it within the reach of the poorest, and, as the New Testament section appears to be a drug with the booksellers, the wisdom of cheap editions justifies itself.

Coincident with this publication is a re-issue of the celebrated *Biblia Pauperum*, or Bible of the Poor. This is a collection of pictures illustrating the story of man's redemption, accompanied by verses from the Scriptures in Latin, and, together with the "Mirror of Human Salvation" (*Speculum Humanæ Salvationis*) was the chief text-book used by the preaching monks. It was compiled in the thirteenth century, and printed in the fifteenth century, being probably the first book in which blocks were used, and it was followed, a few years later, by the printing and secret conveyance into England of Tyndale's New Testament, in fulfilment of that noble martyr's vow that "if God would spare his life, ere many years he would cause the boy who driveth the plough to know more of the Scriptures than did all the priests."

The completion of the Revised Version, and the re-publication of the *Biblia Pauperum*, suggests some account of methods employed both here and on the Continent, when the Bible was an unknown or prohibited book, for bringing home to the people the central facts of which it is the vehicle—an account the interest of which is greater for the student of human progress than for the antiquarian.

For many centuries such knowledge of the events nar-

* *Vide Times*, June 12th.

rated in the Bible as the unlettered laity possessed was diffused orally by means of paraphrases in local dialects and alliterative metre. The first native poem having these events for its subject was the work of Cædmon, a cowherd of the monastery of Whitby, concerning whom the tradition is that when sleeping in the stable-loft One came who said, "Sing, Cædmon, some song to me." Suddenly poetic inspiration seized him, and he poured forth verses which, on awaking, he recited to his fellow-servants. The Abbess Hilda was told this, and promoted Cædmon from the cowshed to the cloister, where he spent his days in making many poems "of the terrors of judgment to come, and of the horrors of hell-pangs, and of the sweetness of the heavenly kingdom," till his death in 680 A.D.

The paraphrases to which his work gave impetus were largely interspersed with quaint and absurd stories and legends, which, however, added to the dramatic element in them, and gave occasion for a certain degree of action on the part of the reciters. These found a willing audience among the retainers in castle-halls before whom the wandering minstrel had sung his ballad, and among the peasants on the village common before whom the strolling mountebanks had performed their tricks and pantomimes. They smoothed the way for that more elaborate presentment of the historical parts of the Old and New Testaments, and of incidents in the lives of the saints, which were the subjects of the early Christian drama and of the Mysteries and Moralities of the Middle Ages.

Miracle Plays is the name commonly given to this drama, but, speaking accurately, the Miracle Play is concerned with some event in the career of martyrs and confessors, while the Mystery, which is later in date, deals with Bible narrative only, the most frequent subject being the redemption of mankind as the central fact around which all the others gather.

In most dictionaries our word *mystery* is erroneously derived through the French from the Latin *mysterium*, as treating of the "mysteries" of the Christian faith, whereas it is the French *mystère*, originally written *mistère*, and derived from *ministère*, because the clergy, the *ministerium* or *ministri ecclesiæ*, were the first actors of religious plays.

The Morality was a didactic allegory, in which virtue and vice, passion and feeling, were personified by the actors; but although it arose independently of, and long remained distinct from, the Mystery, a fusion between them occurred later on, the allegorical figures alternating with historical characters. The plays were originally performed within abbey walls, and viewing the attitude of antagonism which the Church had for ages manifested towards the drama—an attitude justified by the degrading influences of which it had become a too willing agent in its decadence under the Empire—it is at first glance matter for surprise that its revival occurred under her ægis. But the abolition of the theatre did not destroy the passion innate in man for dramatic presentment of life's affairs, or the love and need of some sort of recreation, and this had long found satisfaction in rude and rough amusements which fostered neither morality nor gentleness. In England there was no lack of religious and national festivals. So numerous were they, that in the reign of Henry VIII. the Commons petitioned for their reduction, the more so that they were made occasion for "execrable vices" and "idle and wanton sports." Not only did the restraints upon the clerics and the nuns cause a reaction which expressed itself in travesties of services and rites in the sacred buildings, but the feasts and holy days of the pagan faiths which Christianity had displaced, and which were older than any organised religions, survived with new associations, with new names, and under grotesque and often licentious forms. They typified the character of the rougher races of the North, and flourished with the connivance of a clergy itself not too pure in life. With that profound insight into human nature which has rarely deserted her, with that unerring touch of the material with which she has to deal, which has been a truer inspiration than the higher guidance she has claimed, the Church was moved to gradually utilise for loftier purposes that which had been put to base uses. Whilst tightening her hold she extended her usefulness by recognising in the drama (into whose mould the pre-Christian beliefs were poured, the pagan mysteries being essentially dramatic), a powerful and pliable instrument for relieving the monotony of the monastic and conventual life, and for instructing the unlearned in the history and doctrines which she claimed sole divine authority to teach. In later days, with the supercession of the religious and ethical by the purely secular drama, she disowned and maltreated her foster-offspring, refusing to the players her consoling rites, and denying them burial in consecrated soil; but no desertion of hers can destroy the fact that she was the nursing-mother of Shakspere, Molière, and Goethe, and that the first revival of the theatre is to be found in the religious plays.

Traces occur as far back as the second century of plays the incidents in which are founded on the Bible, and the framework of which is modelled on classic lines,* as in the Passion of Jesus (*Christos Paschôn*), which is after the manner of Euripides, the old choruses being represented by Christian hymns, and as in some plays by Hroswitha, a Benedictine nun of the tenth century, who dramatized legends of the saints on the model of the comedies of Terence. It is probable that her dramas were performed at Gandersheim, within the nunnery, as aids to the instruction of the children under the care of the religious foundations. Three plays by Hilarius, an English monk of the twelfth century, have for their several subjects the raising of Lazarus, the story of Daniel, and a miracle wrought by St. Nicholas, of whom tradition records that even while he was an infant he conformed so rigidly to ecclesiastical rule, that he fasted from the breast on Wednesdays and Fridays!

The earliest recorded performance of a miracle-play is of the play of St. Katherine (*Ludus de S. Katherina*) at Dunstable, in 1119, when the actors borrowed their dresses from the abbey of St. Alban's. This play is referred to by Matthew Paris, a writer in the following century, as of the kind "*quem miracula vulgariter appellamus.*" Performed privately at first, as remarked above, within monastery walls for the recreation of the featureless lives of the inmates, the plays were extended to the church, with the clergy and choristers as actors, and gradually became more popular in form and less restricted in their audiences as their wholesome influence grew more apparent. Originally written in Latin, they were rendered into Norman-French to adapt them for exhibition before the Court, and then into the vernacular† for

* The first drama known to have been written on a Scripture subject is a Jewish play, of which fragments are extant in Greek Iambics. It is taken from the Exodus, and the leading characters are Moses, Sapphora, and God in the burning bush.

† In the Brit. Mus. MS. of the Chester Plays, it is related that the author "was thrice at Rome before he could obtain leave of the Pope to have them in the English tongue."

the entertainment and edification of the people,* the clerical character of the actors being shown by the retention of the stage directions in Latin. In 1210, Innocent III. sanctioned their performance outside the churches, before the door or in the churchyard, or in other open places, on fixed or movable stages; and a further step towards secularization was made when the control of the plays passed into lay hands, from the clergy to the trade guilds, by whom they were acted in the chief thoroughfares of the large towns.

These innovations were due not merely to the increasing importance of the miracle plays as sources of instruction, but also to the growing demand of the townspeople for diversion as material progress left a larger margin of leisure. And it is interesting to note that the passage of the plays from beyond the church nave is connected with the growth of another institution of unsuspected ecclesiastical origin—the national fair—which had its rise in supplying the needs of pilgrims gathered round abbey walls and shrines to honour the festival of the patron saint whose relics lay beneath the altar.

As late as the reign of Henry VII. half England was fen and forest. Through the dense masses of the one wandered the roe and the red deer, and the silence of the immense breadths of the other was broken only by the cry of wild birds, the bustard, and the swan, and by the ringing of the vesper bell from the monastery rising like a beacon across the wastes.

The richest lands, mostly pasture, were in the hands of the monks, who swarmed in thousands like locusts over the country, whilst round them was a peasant class, often reduced by severe fluctuations in harvests to eat bread made of peas, vetches, and fern roots. Moreover, the centres of supply were too scattered, and the garners of the abbeys too limited, to feed the hungry crowd that, attracted by their holy relics, encamped in or about the grounds in tents which survive amongst us in the booths of country fairs. With these were the stalls of the dealers and the bazaars of the travelling merchants, who took advantage of the concourse for bargaining their wares, and for purposes of general trading. The fair was named after the saint whose *festa* brought the pilgrims together, and which was utilised by the clergy for acting the Miracle Play, or some series of events from scripture history in the Mystery. "Thus in the time of Constantine, Jews, Gentiles, and Christians assembled in great numbers to perform their several rites about a tree reported to be the oak Mambre, under which Abraham received the angels; at the same place," adds Zosimus, "there also came together many traders, both for sale and purchase of their wares."† In the larger towns, the trade guilds had each their patron saint, and the day dedicated to him became the occasion for pageants, in which a miracle play was performed, first in the hall of the guild, and then in the thoroughfares. The stage appointments became more elaborate, the characters of the plays underwent extensive alteration, tragedy was relieved by comedy, the sacred story enlivened with jest and tinged with local colouring, and the way gradually opened for the ultimate release of the drama from ecclesiastical swaddling-clothes, and the bestowal upon it of that independent life which grew into such vigour and splendour in the England of Elizabeth.

* There is a MS. of the sixteenth century extant in the Bodleian Library of three miracle-plays written in the old Cymric of Cornwall, the subjects of which are "The Origin of the World," "The Passion of our Lord," and "The Resurrection of our Lord"; and Carew, in his "Survey of Cornwall" (1602), describes the earthern amphitheatres built by the Cornishmen for the performance of miracle-plays. Cf. "Morley's Eng. Writers," vol. I., 748.

† Morley's "Bartholomew Fair," p. 16.

OUR HOUSEHOLD INSECTS.

By E. A. Butler.

COLEOPTERA (*continued*).

THE beetles whose ravages and life history have already occupied our attention illustrate very well two of the great primary divisions of the Coleoptera, viz., the Teredilia, or Wood-borers, containing the death-watch and its allies, which are all summed up in a single small family, and the Clavicornia, or Clubhorns, to which the bacon-beetle and its skin-devouring relatives are referable. We thus see that in each section, out of some hundreds of species of more or less similar structure, only a very small proportion, and those almost entirely confined to a single family in each case, bring themselves into collision with human household interests.

And in the same way, to get our next illustrations, we must go to another great primary section of the order, and select a few species therefrom. This section is called the Heteromera, a word which, being literally translated from the Greek, means "different joints," and is given in reference to a peculiarity by which these insects are sharply distinguished from most of those already referred to, viz., that while the tarsi, or feet, of the first two pairs of legs consist of five little joints succeeding one another in longitudinal row, those of the hind pair have only four such joints, our preceding examples, except the little oddity *Mycetœa*, having been furnished with five on all their limbs.

The Heteromera are a remarkable set of insects, more fully represented in tropical countries than in our own islands. We possess less than 120 species, and these do not all rightfully belong to us; but even this small number includes insects of such diverse habits and structure as to necessitate their subdivision into nearly sixty genera. The economy of some, too—such as the familiar oil-beetle—is more wonderful than that of any other Coleoptera whatever.

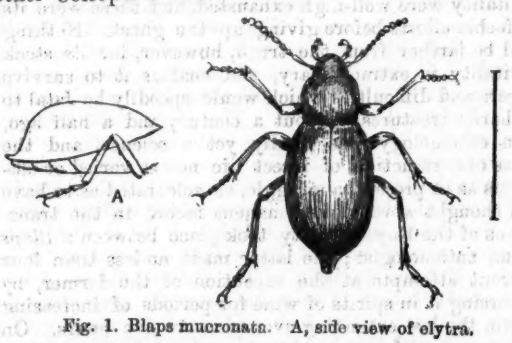


Fig. 1. Blaps mucronata. A, side view of elytra.

Our first example from this group is the insect known to science as *Blaps mucronata* (Fig. 1), and popularly called the "churchyard beetle" and "cellar beetle." It is utterly unlike any other British insect except the other two members of its own genus, and these it resembles so closely as to be with difficulty distinguishable from them. It is a dull-black creature, nearly an inch in length, with long straggling legs, and without wings, though the wing-covers, or elytra, are even more

largely developed than usual. These cannot, however, be opened, and are, indeed, actually fastened together—"soldered" is the technical term—along their central line of junction, thus forming a flattened arch over the body.

It shows no trace of ornamentation on any part of its body, not even the customary longitudinal furrows and rows of punctures so characteristic of beetles, and at first sight the integument seems to be perfectly smooth; examination with a lens, however, reveals a minute and indistinct, irregularly-scattered punctuation. The body is broadest a little behind the middle, and at the tail, the elytra, instead of terminating in a smooth, evenly-rounded edge, are each produced, at the tip, into a blunt projection curled upwards. The name *mucronata*, from the Latin *mucro*, a spear-point, refers to this odd little tail, which is, nevertheless, not confined to this species, but is represented in one form or other throughout the genus. Turning next to the organs of sense, we find another striking peculiarity in the eyes. Instead of forming projecting rounded masses, as is usually the case, they consist of two long, narrow, almost kidney-shaped strips, just behind the antennæ, and not raised above the general surface; this want of prominence of the visual organs finds its explanation in the darkling habits of the creature. Finally, the last four joints of the antennæ are like round black beads.

Blaps has really very little to recommend it. Its dull, sombre aspect is the reverse of attractive, and agrees well with the retirement and obscurity of its life. Clad so completely in the deepest of mourning, it could not be let alone by superstition, and has therefore been regarded with terror as an ally of the powers of darkness, and an associate of death—a creature whose natural abode could be none other than a charnel-house. Ideas so fostered found apparent support in the repulsive odour it continually emits, resembling that of putrid flesh, and in its not unfrequent occurrence in churchyards. Its disgusting odour is produced by the vaporisation of a fluid found in two oblong vesicles near the tail.

An unusual length of legs is generally an indication of agility, but not so with *Blaps*, which is a very tortoise in speed. It leisurely lifts one leg after the other, cautiously bringing them again to the ground, as though its vitality were well-nigh exhausted, and these were its last feeble efforts before giving up the ghost. Nothing could be farther from the truth, however, for its stock of vitality is extraordinary, and enables it to survive dangers and difficulties which would speedily be fatal to less hardy creatures. About a century and a half ago, when entomology was hardly yet a science, and the means of destruction of insect life not so varied or efficacious as at present, a struggle, so celebrated as to have been thought worthy of permanent record in the transactions of the Royal Society, took place between a *Blaps* and an entomologist; the latter made no less than four different attempts at the execution of the former, by immersing it in spirits of wine for periods of increasing length, the last extending over some twelve hours. On each occasion life appeared to be extinct, but each time also, on being removed from the fluid, the apparent corpse became reanimated, and the victim of alcoholic excess entered on a new lease of life, till at last the sentence was remitted, and the insect lived with its captor unmolested for three years afterwards, and even then the record of its experiences was brought to a close, not by its own decease, but by the carelessness of a domestic, who allowed it to escape.

This insect is often found in cellars, stables, and outhouses, dark and damp spots being especially congenial to its tastes. It shuns the light of day, and is chiefly nocturnal in habits. Though so disgusting in smell, it found a place in the Materia Medica of the Romans, being recommended by Pliny as an infallible remedy in the case of ulcers which would yield to no milder treatment.

The larva is a long, narrow creature, with six short legs in front, very similar to an ordinary meal-worm, to which, indeed, it is not very distantly related. It is of a pale yellowish-white colour, and not hairy like those of the *Dermestidæ*. This, therefore, is the third type of larva we have met with; the first, of the *Ptinidæ*, plump, fleshy, soft, pale, and curved; the second, of the *Dermestidæ*, densely hairy, like moths' caterpillars, and the third, that of *Blaps*, long, narrow, and smooth. The larva of an allied species has been turned to account by the women of Egypt, who, following the precepts of "insectarianism," are said to make a savoury dish of the grub by roasting it and serving in butter, partaking of it with a view to the cultivation of *embonpoint*.

(To be continued.)

NOTES ON MAPPING.

By RICHARD A. PROCTOR.

CENTRAL PROJECTIONS.

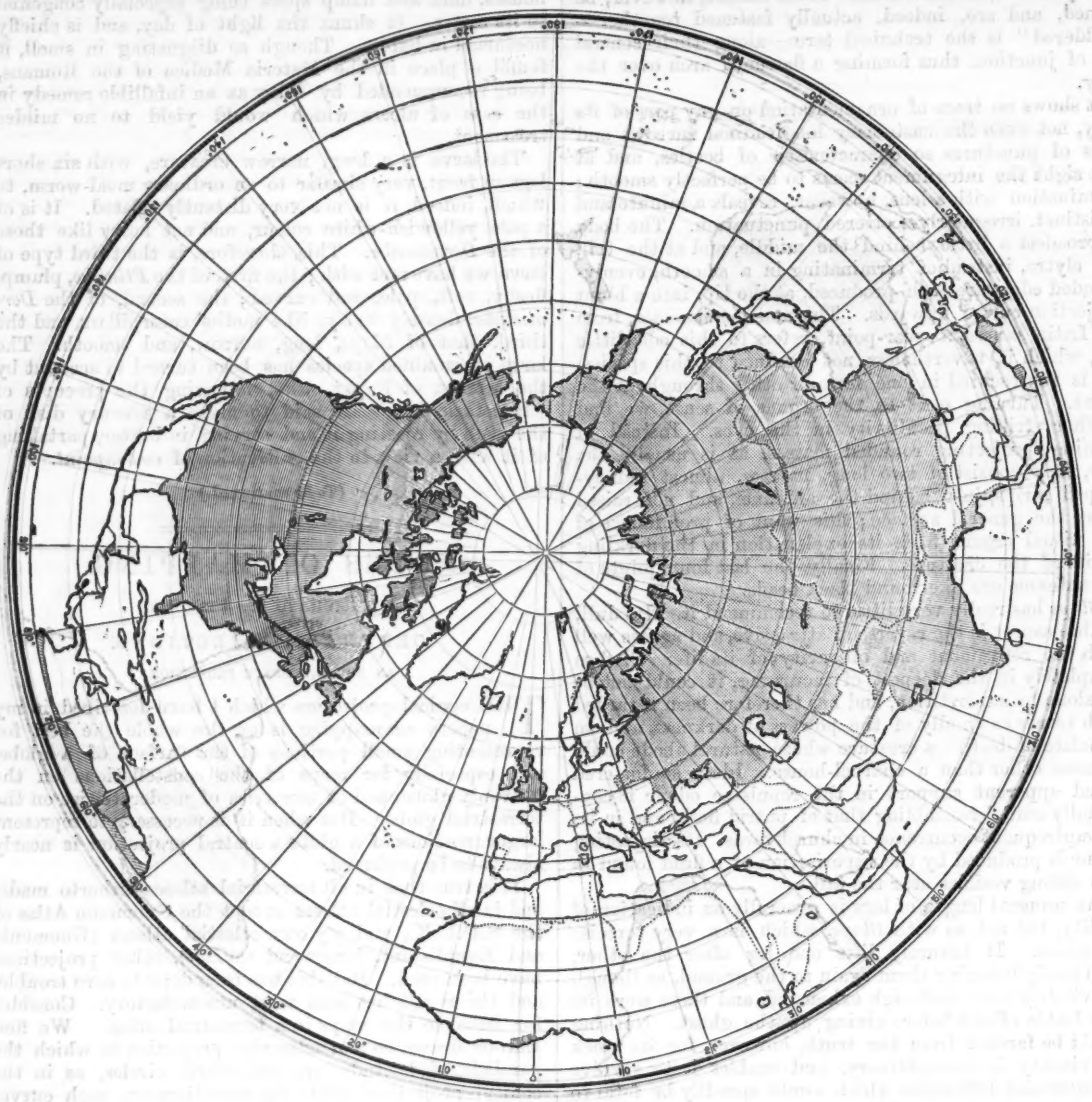
AN EQUAL SURFACE PROJECTION.

THE conical projection which I have described in my papers on mapping is on the whole the best for representing small portions of the surface of a globe, and especially for maps of the constellations on the heavenly globe, and of countries of moderate size on the terrestrial globe. But when it is necessary to represent larger portions of a globe a central projection is nearly always to be preferred.

It is true that in all terrestrial atlases hitherto made, and in all celestial atlases except the Gnomonic Atlas of the S.D.U.K., and my own celestial atlases (Gnomonic and Equidistant, larger and smaller), other projections have been used. But this has been done to save trouble, and the result has been most unsatisfactory. Consider for instance the maps in a terrestrial atlas. We find Europe drawn on a nondescript projection in which the parallels of latitude are concentric circles, as in the conical projection, while the meridians are such curves as result from measuring off successive equal arcs along each of these concentric circles, the arcs being larger as the radius of the circle on which they are measured off is longer. Asia and North America are on similarly absurd projections, and being much larger are much more distorted, insomuch that at the upper corners of these maps the outlines are hardly recognisable. Africa and South America are on a projection in which the parallels are straight. Small countries are on the conical projection. The hemispheres are on a projection which has no definable character, except that it is rather easily drawn. Then we have the chart of the world on Mercator's Projection, which, however serviceable for navigation, is perhaps less suitable for geographical purposes than any projection yet invented.

This variety, and the resulting incongruity, render our atlases far less instructive and less truthful than they should be, and as they might easily be made. There is no reason why one and the same projection should not be used for all large sections of the earth's surface, as I

XUM

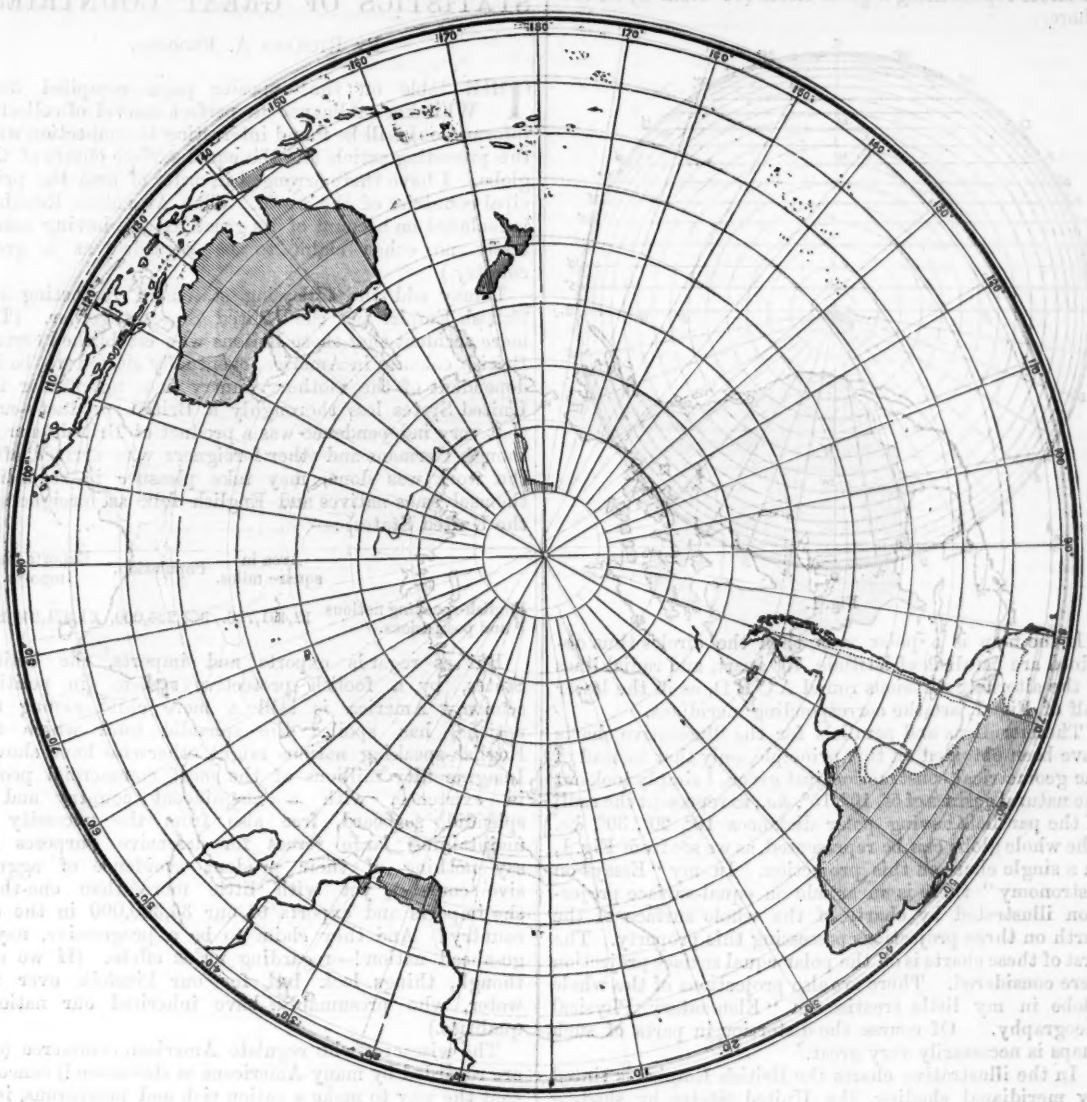


have shown to be possible for the surface of the celestial sphere. Somewhat more labour would, of course, be involved; but only in making the projections (once for all); and the result would amply repay the trouble.

I propose to give here some examples of central projections fulfilling various qualities, leaving to another occasion—possibly to future mathematical papers—the discussion of the geometrical principles on which these various methods depend.

I take first the equal surface projection which I have used so often in star-maps—as in my chart of 324,000 stars, my charts of the northern and southern heavens, and in other cases. The reason why I take this first is not that it naturally comes first, in the discussion of central projections; for I think the equidistant projection should come first, and the stereographic next. But in separate papers such as those I write here on mapping, a strict order need not be observed in such matters; and just now it has occurred to me that an equal-surface projection of the earth's surface would be interesting to English folk, much exercised as they have been by anxiety lest other nations should occupy too extended or too advantageous a position on the surface of our little world. I have before me as I write a large coloured chart on Mercator's Projection, from the *Illustrated London News;* and therein I see our British Empire (which has grown so largely and prospered so greatly under the influential sway of the gifted authoress of "Our Diary in the Highlands"), tinted red for comparison with the yellow-tinted empire over which the Emperor of all the Russias bears beneficent and fatherly sway. The chart is interesting;* but it is impossible to form

* Comparing it with the maps of the world which I drew as a boy, I note how far Russia has wickedly spread over Central Asia, and how near the boundaries of the Russian Empire and of British India have approached each other. The true-born Briton feels proud to think how Great Britain's daring has been in extending her dominion northwards and westwards in India so rapidly, notwith-



the least idea of the dimensions of the various empires of the world from a chart on Mercator's Projection. The Russian Empire is preposterously magnified, our Indian Empire (I beg ten thousand pardons, I should have said her Most Gracious Majesty's) as absurdly reduced. Greenland is larger, on such a projection, than Africa; British America very much larger than Australia, and other monstrous errors of area are presented.

The accompanying charts are on a central equal-surface projection. The projection is obtained (or *may* be obtained, for in practice the use of a table of natural sines is far more convenient) by the construction shown on next page.

Let the equal straight lines AOB, COD (Fig. 1) intersect at right angles in O, the bi-section of each; and let AO equal the diameter of the globe we wish to project. Divide each of the quadrants, AC, CB, into eighteen arcs of 5° each. Connect in pairs the division marks equi-distant from A and B, as shown in the figure, by lines cutting OC in *k*, *l*, *m*, *n*, &c. Then OK is the radius for the projection of the small circle 10° from O; O*l* is the radius for the small circle 20° from O; and so on. Thus if P and P′ are 35° from A and B, and PP′ cuts OC in N, the circle N *p* N′ about O as centre represents the circle on the globe 70° from O. Similarly M *q* M′ is

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standing the well-known fact that as soon as the Russian Empire reaches India, our power in India is bound to collapse. If this daring advance towards the Russians has been accompanied by some rather perplexing, shivering fits at *their* advance towards us (which manifestly is a very different matter) we may perhaps explain this as due to the belief that that remarkable document known as Peter the Great's Will was, as it were, a divinely-inspired prophecy. For somehow the Germans and Austrians manage to live without anxiety-agues though bordering directly on the Russian Empire, and even the unspeakable Turk does not proclaim his terror of approaching dissolution so loudly as some in our British Parliament proclaimed their assurance that because Russia has appropriated a few hundreds of square miles a thousand miles away from our borders, our rule over India is doomed.

the circle representing a great circle (90° from O) on the sphere.

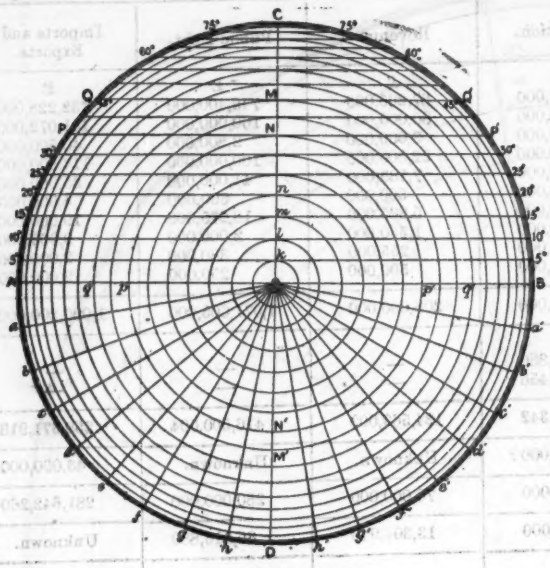

Fig. 1.

If the map is a polar map, then the circles thus obtained are parallels of latitude, 10° apart, and radial lines to the alternate divisions round A C B D, as in the lower half of Fig. 1, are the corresponding meridians.

The meridians and parallels for the illustrative charts have been obtained on this principle, only that instead of the geometrical construction just given, I simply took out the natural cosines of 5°, 10°, 15°, &c., to represent the radii of the parallels having polar distances 10°, 20°, 30°, &c. The whole globe can be represented, as we see from Fig. 1, in a single chart on this projection. In my "Essays on Astronomy" there is an article on equal-surface projection illustrated by charts of the whole surface of the earth on three projections possessing this property. The first of these charts is on the polar equal surface projection here considered. There are also projections of the whole globe in my little treatise on "Elementary Physical Geography." Of course the distortion in parts of such maps is necessarily very great.

In the illustrative charts the British Empire is tinted by meridianal shading, the United States by shading along latitude parallels, the Chinese Empire by slant lines in one direction, the Empire of Brazil by slant lines in another direction, and the Russian Empire is spotted. [By the way, when we consider that the British Empire is not much more than half-a-million square miles larger than the Russian, and note the limited shore-line we command, our anxieties about Russian encroachments in Central Asia seem more than justified. There is a bare possibility that Russia may one day extend across Persia or Afghanistan, *so as actually to reach the shores of the Indian Ocean!* What a terrible thing that would be for British commerce!]

PHOTOGRAPHY continues to increase in popularity. A new society just established in Birmingham starts with seventy members, and promises to be of real use to the town and district. The meetings are held in the Technical School, Bridge-street. Dr. Hill Norris is President; Mr. W. Jerome Harrison, F.G.S., vice-president; and Mr. Joyner, of 43, Bull-street, hon. secretary. At the first excursion—to Salford Priors, on June 27—nineteen members were present, and seventy-three plates were exposed.

STATISTICS OF GREAT COUNTRIES.

BY RICHARD A. PROCTOR.

THE table on the opposite page, compiled from Whitaker's Almanac (a perfect marvel of collected information) will be found interesting in connection with the preceding article and the equal surface charts of the globe. I have there arranged in order of area the principal countries of the world. (The Argentine Republic is included on account of its great extent, having manifestly no other claim to be regarded as a great country.)

I may add the following statement respecting the British Empire and the United States together. (The mere accident that those Britons who established certain British colonies in America, eventually elected to be independent of the mother country does not render the United States less thoroughly a British product—nay, that very independence was a product of British energy, though Germans and other foreigners who arrived after the work was done, may take pleasure in regarding themselves as natives and English folk as foreigners in the United States):—

	Area in square miles.	Population.	Exports and Imports.
English-speaking nations and possessions.	12,491,726.	367,225,000.	£1,371,842,260.

But as regards exports and imports, the United States, by a foolish protective system (in political economy America is still a mere child among the nations) has spoiled the splendid total which the English-speaking nations might otherwise have shown. Imagine fifty millions of the most commercial people in existence, with a magnificent country and a splendid seaboard, free also from the necessity of maintaining large forces for defensive purposes (to say nothing of their prudent avoidance of aggressive courses), yet with little more than one-third the imports and exports of our 36,300,000 in the old country! And they claim to be a progressive, nay a go-ahead nation!—regarding us as effete. (If we are, though, things look bad for our kinsfolk over the water, who presumably have inherited our national qualities.)

The wiseacres who regulate American commerce (and are regarded by many Americans as statesmen!) conceive that the way to make a nation rich and prosperous, is to force it to manufacture at great cost (and pretty badly, too, in many cases) what they could get more cheaply, and much better, from other nations. They neglect altogether the splendid opportunities which America would have if she drove—as she could—a roaring trade with other nations in the multitudinous articles which her people can manufacture well, and (owing to natural advantages) at less cost than other countries. They imagine the artificial rise of wages to meet the enormous extra cost for necessaries of many sorts, a real gain; not seeing that labour would be far more profitably remunerated, and have a much more rapid (because a more natural) growth if directed to such manufactures as would make of America a great exporting nation. And because the old country (which has long since come to years of discretion and has learned that as among individuals so among nations, the loss of one is a loss for all and the gain of one the gain of all) would be glad to see wiser counsels prevail, America fondly imagines that Britain would be the only gainer if America threw away

	Area in Square Miles.	Population.	Revenue.	Public Debt.	Imports and Exports.
BRITISH EMPIRE:—			£	£	£
Great Britain and Ireland	121,115	36,300,000	87,205,000	746,400,000	732,228,000
Indian Possessions	1,558,254	258,000,000	80,000,000	160,000,000	131,072,000
Other Eastern Possessions	30,000	3,900,000	3,000,000	2,800,000	40,500,000
Australasian	3,181,344	3,100,000	22,000,000	100,000,000	114,500,000
North American	3,620,500	4,650,000	7,185,000	41,000,000	35,000,000
In Guiana	100,000	200,000	500,000	500,000	4,000,000
African	270,000	2,350,000	5,805,000	18,275,000	19,000,000
In West Indies, &c.	12,707	1,350,000	1,550,000	2,000,000	9,900,000
European Possessions	120	175,000	255,000	380,000	2,000,000
Various Settlements	96,171	200,000	500,000	250,000	2,000,000
Total	8,990,211	310,225,000	208,000,000	1,071,605,000	1,090,200,000
RUSSIAN EMPIRE:—					
European	2,074,686	84,851,886	—	—	—
Asiatic	6,250,707	15,186,456	—	—	—
Total	8,325,393	100,038,342	124,563,002	416,500,004	258,871,918
CHINESE EMPIRE	4,540,000	250,000,000 ?	Unknown.	Unknown.	43,000,000
UNITED STATES	3,501,515	57,000,000	70,000,000	280,000,000	281,642,260
EMPIRE OF BRAZIL	3,288,000	10,200,000	13,304,940	86,316,880	Unknown.
TURKISH EMPIRE:—					
European	130,571*	8,971,000*	—	—	—
Asiatic	729,981	17,536,465 ? ?	—	—	—
African (nominal sovereignty), including:—					
Egypt	212,600	5,517,000	—	—	—
Tripoli	344,400	1,200,000 ?	—	—	—
Tunis	45,716	1,500,000 ?	—	—	—
Total	1,463,268	34,724,465	14,500,000	107,500,000	Unknown.
ARGENTINE REPUBLIC	1,357,896	2,540,000	6,247,330	26,934,500	5,849,790
FRANCE:—					
European	204,096	37,672,048	—	—	—
African Possessions	300,000	3,250,000	—	—	—
Total	504,096	40,922,048	132,673,709	942,000,000	358,142,680
AUSTRO-HUNGARIAN EMPIRE	240,940	38,000,000	76,680,034	452,428,217	Abt. 62,000,000
GERMAN EMPIRE	210,161	45,234,061	29,540,967	18,947,358	331,200,000
ITALY	114,408	28,459,451	62,519,002	Abt. 100,000,000	101,164,671

* Including Bulgaria, Eastern Roumelia, and Bosnia.

the weakening bandages of the so-called protective system. America has now for many years been engaged in diligently biting off her nose to spite her face.

WATCH-MAKING AT THE INVENTIONS EXHIBITION.

(*Continued from p. 523.*)

IN the dial-making room are performed the various operations necessary to the production of dials. The dial consists of a sheet of copper, which, in a single operation, is cut and pressed to shape, and pierced for the passage of the hand centres at the necessary places. After this, the dial feet are brazed on. These feet, which attach the dial to the watch movement, may be seen under manufacture at the Exhibition. Lengths of copper wire are put into the machine, which automatically cuts them to the required size and cleans off the ends of each piece. A vitreous or glassy solution is applied to both sides of the dial, which is then fused on in suitable gas furnaces (Fig. 9). The next step is to paint on the hours, which is done by hand with a camel's hair brush. When these figures are finished and the surplus paint scraped off, the company's name and then the minutes are painted on. The paint used for these purposes is also of a vitreous nature, whence each dial has to be again placed in a furnace to fix the enamel letters.

In the Gilding Room (Fig. 10) electricity is, perforce, largely employed in the various processes involved. All brass movements, after receiving what jewelling they may require, are immersed in a nitric, sulphuric, or hydrochloric acid bath for cleansing purposes. Any particles of foreign matter not removed by the bathing

yield to the influence of revolving wire-brushes, to which the parts are subjected prior to their immersion in the gilding solution.

The electricity necessary for the gilding is derived, in some cases, from the well-known Daniell battery, and in other from dynamo-electric machines. There is little doubt that the great amount of attention recently bestowed on dynamos for the purpose of electro-deposition will speedily result in the exclusive use of those machines in places where a considerable and steady flow of work has to be got through. It is stated that the works of every thousand watches absorb in the gilding processes eight to ten pounds' worth of the precious metal. As our readers are doubtless aware, the gilding solution is of a highly poisonous nature, and the fumes or vapours arising therefrom are none of the healthiest. To get rid of these, an exhaust-fan is provided to free the room of such impurities.

Fig. 11 illustrates the case-making department. Only silver cases, however, are made at the Waltham factory, the gold ones being manufactured in the New York establishment. The silver bars are rolled down into sheets and then cut and pressed to shape—the parts being subsequently fitted together in the turning-room. The jointing and soldering is then done. The cases are next milled through for the joints, and the caps put on. In the opening-room the winding crown is put on, and the joints fixed so that the case will open at right angles. It next goes to the springing-room to receive the lifting spring and catch spring. The parts are then separated for polishing, and the backs sent to the engraver and engine-turner. It is next matched up again, and the pins put in, and finally polished; after which it is backed and glassed ready for delivery. There are 150 operations needed to manufacture an ordinary watch-case. The department produces 700 silver cases a day, employing 400 hands. The stock on hand comprises £18,000 worth of silver, and about £2,000 in gold for joints, &c., to guard which three large vaults have been constructed. The washings of aprons and hands, and the sweepings of the floors, and the cast-off garments of the workmen, are all saved up to be reclaimed in the refining-room; and thus a large amount of metal is saved.

This closes our remarks on the sections of the factory. Suffice it to say, in conclusion, that, since the Paris Exhibition of 1878, the cost of producing a watch movement has been reduced to about one-half of what it then was, and that consequently the trade, both for home use and for export, is rising rapidly. The introduction of machinery is so extensive that the manager can undertake to draw the raw materials from stock in the morning, and have a watch made from them at noon, every part of the work being done on the establishment, with the solitary exception of making the mainspring, which is of French production.

As evidence of the rapid strides into public favour of Waltham watches in recent times, it may be stated it took the company twenty-three years to make the first million watches, six years to make the second million, and the third million has been made in two years, while at present so great is the demand for them that the company is preparing machinery to produce 2,000 watches per day. The Waltham Watch Company's tools and machines are one of the chief centres of attraction at the Inventions Exhibition, and are daily visited by eager throngs, among whom may be noted the leading scientific men and mechanicians of the day, who invariably admire the celerity, wonderful ingenuity, and marvellous accuracy of these lifelike automatic machines.

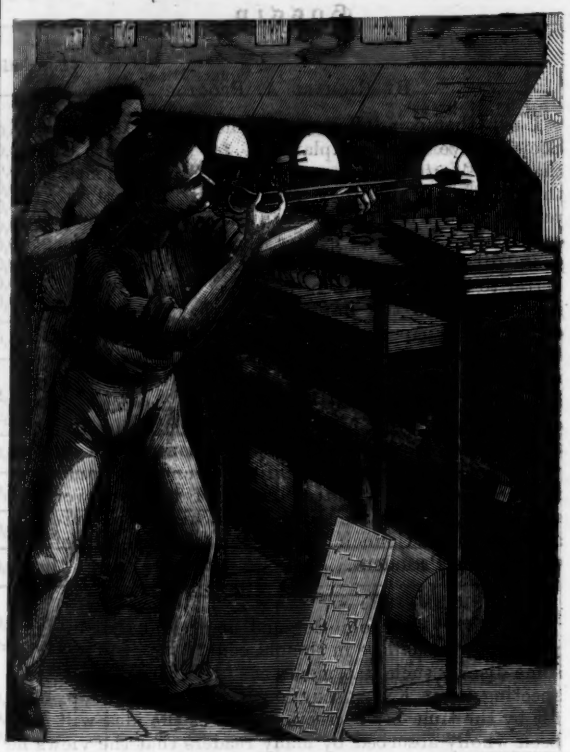

Fig. 9.

Fig. 10.

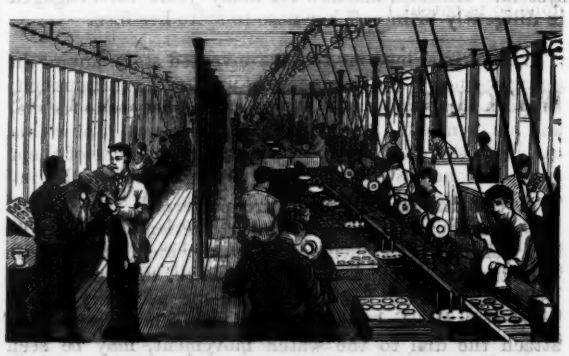

Fig. 11.

Gossip.

BY RICHARD A. PROCTOR.

I SEE that some Fellows of the Royal Astronomical Society have been complaining—for the fiftieth time—that the *Monthly Notices* only come out a month after the meeting when they were read. In reply to the remark that when I conducted the notices the papers came out a fortnight earlier, those responsible for the gross dilatoriness complained of, answered that it was better to bring the papers out free from errors than in good time. To the implied idea that there were more errors in the papers in my time than now, I reply that the insinuation is untrue. The proportion of errata to the quantity of matter was if anything less in my time; but the quantity of matter was much greater. To the question, how I managed to get out the *Notices* in good time, I answer that if I had not managed to do so I would not have accepted the fifteen pounds paid quarterly for the work. As a matter of fact, I did work worth *to me* about six times the stipend for which I consented, as a favour to the Council, to hold the office while Professor Cayley was President.

BEING very far from England at present (but in a few weeks now I shall be in the old country again) I see with some dismay such statements as "Hallyards" makes respecting me, in KNOWLEDGE for May 29 (let. 1723, p. 465); for by the time my correction arrives the idea will have been wholly absorbed by many readers that the views he has attributed to me are really mine, and correction is apt to avail little after that. "The Conductor of KNOWLEDGE has remarked somewhere," he says, "that it is rash to suppose all bodies to be moving in curves, that probably many stars move in straight lines." Where and when have I ever said anything so absurd? I know of no time since I was ten or twelve years old, when I have not known better,—always excepting my sleeping hours, during which I may, for aught I know or can remember, have dreamed of stars moving in straight lines, just as I have dreamed of dead folk talking to me, and the like. A little further on "Hallyards" says that he thinks "the Conductor of KNOWLEDGE has remarked somewhere that space *cannot* be infinite." I have said that we cannot imagine space *otherwise* than infinite, most assuredly not what "Hallyards" attributes to me. The nearest approach to it has been my remark that we cannot *conceive* infinite space,—a mightily different matter. (I cannot conceive how "Hallyards" has misapprehended me so strangely; but the fact that he *has* done so is patent.)

HAVING imagined me to have invented stars moving in straight lines "Hallyards" gets up a sort of discussion, between this semi-idiotic second self he has made for me, and his own self. "I do not see," he says, "how this can be if there is even the very least pull on one of them from the nearest larger body: if gravitation be indeed true for all distances, then I do not see how any body can avoid an orbit." Neither do I, but my second self is made to argue very foolishly that a body *can* avoid an orbit. "It will be replied," "Hallyards" remarks, "that their rate of translation will overcome the pull of the nearest body,"—though any one who would reply thus would say anything. "But there again," he proceeds, "seems" ("seems, nay is, I know no seems") "another exception to the universality—or at least, the autocracy—of gravitation." All this is naught.

IT is a misfortune that few men of science will condescend to avoid the use of technical terms, while scarcely any seem able, even if they were willing, to write intelligibly even when they use ordinary words. But it is a worse fault still that many writers about scientific matters seem to consider the constant use of metaphors essential to effect. It would almost seem that they imagine the facts of science to be without interest unless presented in fanciful form.

HERE for instance is a passage from an article in the *Times* for May 27, in which the application of photography to science is considered. (The article, by the way, presents, as very striking and novel in the middle of 1885, rather less than I described as accomplished facts in the second number of *Longman's Magazine*, two years and a half ago.):—

"Every fresh step in optical mechanics has multiplied the working capital of philosophy" (imagine the multiplication of capital by walking!). "A refractor like that at Washington widens at a bound the reach of astronomical generalisations." (Imagine, yet again, something which widens the reach of some other things by bounding!). "It resembles for the eyes an extension of a range of several miles for a gun." (An extension in what degree? for a range of several miles may be extended by a yard or by half a mile.) "The weakness of the telescope is that, as the eyes are quickened and sharpened by it, so it is chained by and to the eyes." (The eyes are quickened and sharpened, it would seem, by something—whether the telescope or the telescope's weakness, is not clear—which is chained by them and to them! Surely as a metaphor this surpasses the rat which Castlereagh "smelt," and saw "floating in the air," but promised presently to "nip in the bud.") "Chemistry puts forth its prepared gelatine and bids it concentrate itself on hoarding each thin ray which strikes it, as children's pence in a school bank." (Angels and ministers of grace defend us! What may this mean? Do the thin rays strike chemistry like children's pence in a school bank? or do they strike gelatine after that strange fashion? Then, what is a thin ray? And why should a thin ray be more aggressive than a fat one? or be hoarded more carefully?)

THE Darwin Medal for 1884-5—founded by the Midland Union of Natural History Societies—has been awarded to our contributor, Mr. W. Jerome Harrison, F.G.S., for his geological researches.

MESSRS. KEGAN PAUL, TRENCH, & Co. will publish immediately a new and much cheaper edition of Mr. Francis George Heath's "Autumnal Leaves."

LONDON BY NIGHT.—Into the grim world of "London by Night," Mr. Thomas Archer has recently made a fresh tour of discovery, and has recorded his impressions in an article which is to appear in *Cassell's Magazine* for July, with illustrations from a well-known pencil.

THE EARTH'S ANNUAL METEORIC GROWTH.—It is calculated by Dr. Kleiber, of St. Petersburg, that 4,950 lb. of meteoric dust fall on the earth every hour—that is, 59 tons a day, and more than 11,435 tons a year. I believe this to be considerably short of the truth. It sounds like a large annual growth, and the downfall of such an enormous mass of meteoric matter seems suggestive of some degree of danger. But in reality Dr. Kleiber's estimate gives only about twenty-five millions of pounds annually, which is less than two ounces annually to each square mile of the earth's surface. —R. A. Proctor, in *Newcastle Weekly Chronicle*.

THE FACE OF THE SKY.

FROM JULY 3 TO JULY 17.

BY "F.R.AS."

THE recent indications of renewed solar activity in the shape of grand spots render the sun a very interesting object whenever the sky is clear. The face of the night sky will be found depicted in Map VII. of "The Stars in their Seasons." Twilight persists all night long during the fortnight which these notes cover. Mercury is an evening star, and, towards the end of the next fourteen days, may quite possibly be picked up with the naked eye over the W.N.W. horizon after sunset. Venus is an evening star, too, and may certainly be seen in the same part of the sky. She is still a very insignificant and uninteresting object in the telescope. Jupiter may be caught pretty close to the horizon after dusk; but at this time he is too low down for telescopic examination. The only phenomena of his Satellites theoretically visible are the reappearance of Satellite IV. from eclipse at 8h. 28m. 40s. on the 3rd; the egress of the shadow of Satellite III. at 8h. 27m., and the occultation of Satellite II. at 8h. 50m. on the 13th; the occultation of Satellite I. at 9h. 38m. on the 14th; and the egress of the same satellite at 9h. 15m. the next night. The observation of any of these is, however, doubtful. Mars and Saturn are invisible, as is Neptune too; but Uranus may possibly be seen under unfavourable conditions as soon as it is sufficiently dark. The Moon enters her last quarter 25·6 minutes after noon on July 5, and will be New at 5h. 15·8m a.m. on the 12th. High tides may be expected about this date. No occultations of fixed stars will take place during the time which our notes cover, save one of Aldebaran in bright sunlight at 11h. 23m. 26s. a.m. on July 9. When they begin, the Moon is in Pisces, across which she is travelling until 4 p.m. on the 6th, when she enters the N.W. corner of Cetus, quitting it, however, for Aries at 2 o'clock the next morning (that of the 7th). At 6h. 30m. a.m. on the 8th, she crosses the boundary between Aries and Taurus. Her journey through Taurus occupies her until 4h. 30m. p.m. on the 10th, at which hour she passes into the narrow northern strip of Orion. By three o'clock the next day, she has crossed this and emerged in Gemini. At 2h. 30m. p.m. on the 12th, she leaves Gemini for Cancer, and Cancer for Leo in turn at 1 a.m. on the 14th. She is travelling through Leo until 8 a.m. on the 15th, when she descends into Sextans, to re-emerge in Leo at one o'clock the same afternoon. She finally leaves Leo for Virgo at 1 p.m. on the 16th, and is, of course, still in the last-named constellation when these notes terminate.

THE members of the Society of Telegraph Engineers, at the invitation of their president, Mr. Spagnoletti, Telegraph Superintendent of the Great Western Railway, paid a visit to the Swindon Works on Tuesday. Some five hundred members went down by special train, and the visitors spent a most interesting and instructive day. The works, as may be imagined, are of colossal proportions; they cover an area of thirty acres, and give employment to upwards of 5,000 men. No effort was spared, on the part of the railway officials, to make the trip pleasant and profitable to all who took part in it. The possible output is at the rate of one engine, six carriages, and fifty trucks per week.

WE give the following from a paper entitled "On a variation in the size of an image on the retina according to the distance of the background on which it is seen," by Alfred Brothers, F.R.A.S., which was read before the Manchester Literary and Philosophical Society. "The effect on the retina when the eyes have been fixed intently for a few seconds on a brightly-illuminated coloured object is well known; the colour complementary to the one looked at always appears when the gaze is removed to a colourless surface. It is also a matter of common observation that when the eyes have been directed to a bright light for a short time, the image left on the retina as seen when the eyes are averted is *dark*; but if the eyes are rapidly opened and closed the image is still seen *bright*. I am not aware, however, that it has ever been noticed that this image varies in size according to the distance of the background to which the eyes are directed. A circle of gas-jets, perhaps, affords the simplest test. It will be seen after looking at the circle of light for a few seconds—in some cases a more or less lengthened gaze at the light is necessary, owing to the varying sensitiveness of the retina—that, if the vision be turned to a distant background, the size of the image is instantly enlarged, and then, if the eyes be directed to a near background, the image is reduced in size. If any difficulty should be found in seeing the reversed image of the gas-jets, it may readily be seen as a bright object by rapidly closing and opening the eyelids. The effect is the same as if the image were seen through a cone—the apex of the cone being held close to the eyes. In other words, the effect is the reverse of the ordinary rules of perspective."

"Let knowledge grow from more to more."—ALFRED TENNYSON.

Only a small proportion of Letters received can possibly be inserted. Correspondents must not be offended, therefore, should their letters not appear.

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NO COMMUNICATIONS ARE ANSWERED BY POST, EVEN THOUGH STAMPED AND DIRECTED ENVELOPE BE ENCLOSED.

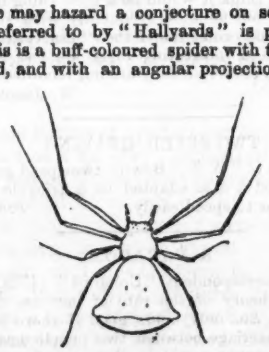
CONVENTIONAL EVOLUTION.

[1790]—Kindly allow me to make one or two suggestions upon what has been happily termed "Conventional Evolution." Every great teacher has followers who lay undue stress upon certain of his doctrines; and sometimes it happens that such doctrines are the least proven, as universal truths, by the master. This, I think, has been the case with Darwin. He certainly relied very much upon small variations in expounding his theory of "natural selection"; but it is doubtful whether he would have made them a *sine qua non*, as his disciples do. Cataclysm and special creation were the favourite hypotheses of our forefathers. We have now gone to the other extreme, and nothing but a growth by infinitesimal gradations will suit us. No kind of break is tolerated. It is assumed that Nature is opposed to any sort of leaps, and, in accordance with that idea, many of our present teachers point to an imaginary chart of brutal ancestry descending by a slow unbroken chain to the parent man—ape. The "missing links," of course, may yet be found, but till they are why draw so largely upon imagination? Has Nature no phenomena by which the breaks can be explained? Does she never pass abruptly from law to law? The author of the "Vestiges" made such a suggestion, but no one, it seems, has ever followed it up. In chemistry we pass from one substance to another by sudden steps. You cannot link calomel to corrosive sublimate by gradations of chlorine. The diamond, too, enters suddenly under the control of laws which have no apparent concern with common charcoal. But leaving the inorganic world on one side, what are we to say to the leap Nature makes in creating a Shakespeare or a Beethoven? Can we lead up to them by a slow ascending series of their ancestors, or do they suddenly appear, like Minervas, fully formed?

I had something to say about Darwin's law of correlation being so much neglected of late, but I am afraid I have already taken up too much space. GAMMA.

SPIDER.

[1791]—If one may hazard a conjecture on so short a description, the spider referred to by "Hallyards" is perhaps *Thomisus abbreviatus*. This is a buff-coloured spider with the body abruptly bent down behind, and with an angular projection on each side of



the upper part at the edge of the bend. But it has *five* small pits on the upper surface. Some members of this genus are found in flowers, and I have seen one so closely resembling in colour the flower (a composite one) amongst whose florets it was lying in

wait for prey, that it was with great difficulty detected. I enclose a sketch of *Thomisus abbreviatus*, which may perhaps enable "Hallyards" to decide whether the determination is correct.

E. A. BUTLER.

THE PREVENTION OF COLLIERY EXPLOSIONS.

[1792]—How many more colliery explosions are we to hear of without preventive measures being at least attempted? Can any expert inform me what would be the cost of the installation of the electric light in mines? Herr Julius Maier, in a recent article in the *Fortnightly* on "Electricity," has proved that the mine-lighting question by electricity has been brought within the range of practical possibilities; and I myself, two years ago, heard Professor Tyndall confess it could be managed, and these terrible disasters averted, if it were not for the expense. Surely some association or society might be formed to collect funds for such a purpose. The British public is ever ready to come forward upon charitable pretexts, and if once it was fully understood that the illumination of mines by electricity was not an impossibility, subscriptions would be forthcoming. Science, who never turns her back upon us when we need her aid, can help our poor miners now if man will let her.

M. E. MAVROGORDATO.

ROCKS OF CHARNWOOD.

[1793]—I am pleased to know that my article on Charnwood has led Mr. Fletcher and his friends to study the remarkable rocks of that region. The quarry which he describes in Brazil Wood is clearly the one to which I referred, and I am glad that he saw clear evidence there of the intrusion of the granitic into the slaty rocks. If he visits the spot again, I hope he will search for the garnets which have been plentifully developed in the altered slate. I found them most abundantly in the corner farthest from the gate. They are dark—nearly black—in colour, and vary in size from microscopic dimensions to about the eighth of an inch in diameter.

The pebbles and gravel lying on the top of Mountsorrel hill—some 200 feet above the level of the Soar Valley—probably mark the stage of depression which followed the deposit in England of the great chalky boulder clay—itself the moraine of a mighty glacier. England went down, perhaps, 2,000 feet in the west and south, but much less in Leicestershire; perhaps not more than 400 feet. Still, this change would be quite sufficient to submerge most of the Charnwood hills, including Mountsorrel, and during the washing and redistribution of the surface boulder clay which then took place, the pebbles now forming a thin covering to the hill-top may have received their rounding.

But Mr. Fletcher states that he found bones and fragments of pottery in the *lower* part of the stratum containing the pebbles. This I consider to be owing to the fact that the stones have been moved partly down the hill by rain, &c., since the time of their original deposition. The real summit of Mountsorrel—long since quarried away—was much higher than the part which now remains. All such exposed summits get washed bare, and the *débris* is pushed down the slopes. I may add that a fine flint javelin-head which I found in probably a corresponding position to the bones, &c., in 1876, would possibly be coeval with them, and that bones, pottery, and all are, I should consider, referable to a period somewhere about the time of the Roman occupation of this country. A comparison with the numerous specimens of pottery in the Leicester Museum would help in settling this point.

I may add that I think it would be a good thing if local workers in science would favour us more frequently with short, condensed notes on matters which come under their observation. It is certain that many useful and interesting facts are lost to the world of science, for, though observed, they are not recorded.

W. JEROME HARRISON.

TWO-SPEED GEARING.

[1794]—In reply to "W. J.," Bown's two-speed gearing performs excellently, provided it is so adapted to a tricycle that it can be changed from power to speed easily. JOHN BROWNING.

A PARADOX.

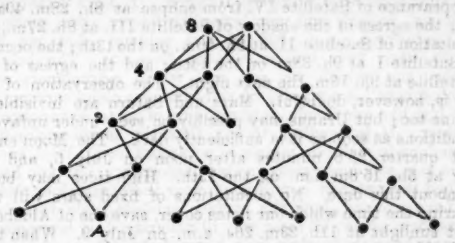
[1795]—Your correspondent "Coleford" (1772) propounds no "paradox." His theory of the rate of increase of grandfathers, great-grandfathers, &c., only holds good if there is never such a thing as an inter-marriage between two people descended from the same ancestors, however remotely they may be connected. Each grandfather represents a family one degree removed, each additional great-grandfather another family two degrees removed, and so on.

Again, it is in no way necessary, as "Coleford" seems to think, that all the great-great-grandfathers or great-great-great-grandfathers should "exist on the earth at one time."

But, in the first place, families cannot help intermarrying as I have indicated, and, in the second place, it is not unusual for a husband to be old enough to be his wife's grandfather. R. L.

[1796]—The solution of the rather curious paradox which occurs upon page 533 is to be found in the following simple facts:—Although every single individual in ordinary parlance is said to possess two grandfathers, four great-grandfathers, &c., these various antecedents are at once, grandfathers, &c., to many other individuals.

Moreover, when marriage is contracted between members of the same family, as is often the case among certain African tribes, it occasionally happens that a person has but *one* grandfather, his father's father and his mother's father being one and the same.



A glance at the annexed diagram will show at once how the matter stands; the dots represent individuals, and those at the extremities of each angle indicate the parents of the person forming the apex thereof pointing downwards. From this it will be seen that if we allot to any individual in the lower line (A for example) his common share of ancestors, he will posses a grandfather on his mother's side and another on his father's side (apparently two, but in reality only one); the fathers of these, and of their wives, make four great-grandfathers (still represented by one) who, with *their* wives, are the offspring of eight great-great-grandfathers (the complete eight, as a matter of fact, being a single individual of the first pair). Again, ten boys, each having a father, should make ten fathers in all, but if the boys are brothers there is only one father. All humanity must be more or less related, and the evident reason which your correspondent requires why the population increases instead of decreasing, is because in almost every case a grandfather has more grandchildren than a single grandchild has grandfathers. ALEX. MACKIE.

[Solutions are also sent by "Scotus," George Falkner, F. W. H., &c.—ED.]

SYMMETRY.

[1797]—I admit, in common with "An Old Draughtsman" (1742), that questions of taste frequently appear to be very complex. But is he right in using the word "symmetry" as synonymous with balance? Surely he is not. Nevertheless, he does not stand alone in this misuse of the word; it occurs over and over again in journals devoted to art subjects. Equiformity, or equipoise, is not symmetry. Symmetry, according to our dictionaries, means harmony of proportion—the proportion of the several parts to the whole together. A work either of Nature or of art may be equipoised without being symmetrical. As to the complexity of matters of taste, it may be said that it frequently disappears as soon as the end to be attained can be clearly formulated.

ANOTHER OLD DRAUGHTSMAN.

LETTERS RECEIVED AND SHORT ANSWERS.

W. C. PENNY was horribly shocked (as well he might be) to read on p. 535 a description of a breakwater which "consists of a number of small boys (!) to be so fastened together that each may float on the water." Thank U.—JOHN SILCOCK knows of a lot of small boys who would suit admirably, and would arrange with the inventor to supply them.—THOS. RADMORE. Thanks for light thrown on the matter. I am a little afraid that that Blue Book is lost in the abyss of the office.—JOSEPH HOMER. Articles sent here "in July, 1883," and unaccompanied by stamped and directed envelopes, must, ages ago, have departed to that bourne whence no MS. returns.—MISS JENNIE MCNEIL. The libration in longitude of the moon varies at each successive lunation, and has to be calculated separately, by a somewhat operose formula. The full moon of June 27 will have passed ere these lines are in print; but in the case of the succeeding one (that of July 26) the

libration in longitude will bring more of the western part of the surface into view.—AUGUSTUS J. HARVEY urges the necessity for national electrical engineering and phonetic training colleges. He is also anxious for the establishment of hospitals for self-mesmerism or self-healing, though why a man cannot cure *himself* at home he fails to explain.—DR. KNIGHT sends comments on a decision (against him) of a local County Court Judge. This is not, however, the place to review legal judgments in.—W. ROBINSON points out, in connection with the article on p. 515, that the omission of any reference to a movable pulley makes it read as though, the rope being simply passed over one fixed pulley, overhead power was in some way gained, the fact being that, under such circumstances, it would need a little over 100 lb. pull upon one end of the rope to pull up 100 lb. at the other.—JOHN PARRY. About as much connection with the scientific doctrine of chances as it has with the Rig-Veda. You will find the concoctor of it described in the 5th Geo. IV., c. 83, s. 4.—AN INSULTED LOVER OF KNOWLEDGE WHO DETESTS HUMBUG. I have received your courteous, logical, and gentlemanlike letter. See section 3 of final paragraph on p. 505 of last volume. Let me implore you to keep your temper.—JAMES EDMONDS. The bright disc of the sun which we see, and which astronomers call the "Photosphere" is a species of self-luminous cloud surrounding the sun; just like our clouds, only made up of metallic vapours instead of water. It is needless to say that the temperature must be stupendous to maintain metals in a gaseous form. Well, such spots as you saw are depressions in this photosphere. If you have ever watched the water in a mill-pond, near the penstock or sluice, you will have noticed how the surface exhibits little funnel-shaped depressions. Now, in some way ill-understood, it is supposed that sun-spots have their origin in a somewhat similar sucking down of the matter of the photosphere, and the cooler gases, of course, brought down from above would look darker than the surrounding highly-heated ones. The nucleus of the spot, which seemed to you black by contrast, would be unbearably brilliant if it could be isolated. You should read "The Sun," by the Conductor of this journal, or the volume with the same title by Professor Young, in the "International Scientific Series."—J. V. HALL suggests to "Hallyards" that he should comment on "commence" for "begin," "penetrate" for "pierce," and, in fact, on the employment of words of Latin origin generally, when Saxon ones exist and are more expressive. We have largely to thank Dr. Johnson for this depravation of the English language. "Hallyards" resides permanently on the Continent.—H. R. B. I recognise the justice of much which you advance; but you must bear in mind that the dicta in question were put forth as those of a dead woman of the highest literary ability, and of almost world-wide fame (or notoriety), and neither as arguments, nor with any expression of approval. I suppose that if I reproduced a conversation here in which Spinoza was an interlocutor, you would accuse me of admitting evidence for Pantheism! You, however, yourself, did unquestionably trench on theological ground, inasmuch as yours was a categorical contention for positive miraculous interference in explanation of a phenomenon of nature. It did not strike me that "Ultra-gas" was advanced to explain the action of gravity. The whole question you raise is a delicate and difficult one. See first reply to Dr. Lewins, for example, at the beginning of p. 534, in illustration of what I have to contend with.—GENERAL BABBAGE. Can any possible advantage accrue from protracting the discussion? As for "calumnies," had the late Mr. Sheepshanks and the present Sir George Airy (to name only two people) nothing to complain of in that respect? In cases of "Athanasius contra mundum," I always think myself that the odds against the saint being right are overwhelming.—C. TURNER. Should have been sent to the publishers.—W. As it will apparently gratify you to have the last word, by all means do so. I can only deplore, for the sake of KNOWLEDGE that you do not edit it. Its circulation could hardly fail to rise another 25,000 a week, or so, *per saltum*.—D. TATTERSALL. To varnish a map you must first size it. The size is made by boiling clean parchment cuttings in an earthenware pot and straining it. Two coats of this should be first brushed over your map. Then, when all is thoroughly dry, varnish it with "Crystal varnish," which you can buy at the shops. Mind and use a large flat brush, and do not drive the varnish too bare. Do it in a warm place. The magnifying power of your telescope is 30 diameters.—J. H. WARD should consult the previous articles on the same subject which have appeared here. I question if such a table of the average dimensions of the various parts of the body as you ask for exists, or could be compiled. Your idea that people in whose outstretched arms a line passing through the middle of the inner fore-arm passes when produced inside the shoulder-joint are more remarkable for mental than physical perfection, can only be established or disproved by observation.—I. J. COLLINS. You are, I imagine, under a delusion as to the general benefit of the operation to which you refer. It *may* be beneficial to some of the filthiest and most degraded races in hot climates, but (as any Indian doctor will tell you) no white man with the average cleanliness of our race, ever has the very slightest need for it in the tropics; while you have only to consult the first qualified medical man you meet to learn how baseless your notion is of its advantage in this country. Forgive me for saying that your whole reasoning is fallacious. It is Art and not Nature that perpetuates hereditary disease by keeping people alive who would infallibly succumb but for its aid. How long do you think the breed of racehorses would remain pure—or fancy pigeons continue without reversion to their ancestral form of the blue rock, but for the most diligent and watchful care on the part of breeders? All this cuts at the very root of your argument.—JAMES ELLIS, in ascending a dry sewer-shaft in Leeds about a year ago, discovered a half-grown frog, with its mouth (seemingly) entirely sealed up. This he gave to a local medical practitioner, who kept it in a Ward's case; where, for some time, no alteration in its mouth took place. Upon the production of the frog, however, for the inspection of some naturalists, it was found to have adapted itself to its changed circumstances, and, under the influence of light and the presence of insects, to have opened a mouth useless to it in the blackness of darkness of the sewer. Our correspondent's idea is that the frog was developed from some spawn thrown away in the water in which some watercresses had been rinsed. Having kept batrachians for many years, I can myself say that when they hybernate, either inspissated saliva, or something, does form a kind of skin, which makes it very difficult for them to open their mouths on their return to their usual life.—DR. CURRAN. Received with thanks. Will communicate with you by-and-by as to your idea of reproducing them.—W. H. GREENE. Thanks, but crowded out for want of space.—DR. LEWINS. I am entirely with you as to the utter unsoundness and untenability of much which you assail; but when you proceed categorically to assert, in effect, that matter is eternal, and that what the overwhelming majority of mankind agree in calling mind, soul, or spirit is immanent in it, and neither has, nor can have, any separate existence, I can only regard such assertion, in the existing condition of our knowledge, as (in Scottish legal phraseology) "not proven." All I can say is Ἀγνοῶ.—COMMENTATOR. The Conductor returns to England in a week or two (see p. 527 of last volume), and it shall be submitted to him. Once more, thanks for artistic picture.—J. C. CLANCHY. Utterly out of place in a scientific journal, however suitable to a trade one.—HALLYARDS. "Est modus in rebus; sunt certi denique fines quos ultra citraque nequit consistere" decorem. If the *Times* can afford to hint at one of your illustrations, *I* can't—I can't indeed. The entire subject savours *de la saleté;* and I was sorry afterwards that I did not merely acknowledge the receipt of that correspondent's letter, instead of replying to it in a form to provoke a rejoinder. Would you like your MS. returned?—HOWARD G. TOZER.—The Conductor will receive your letter on his return to England later on in the month.—F. W. KIND. (1) There is no better work than Schmidt's "Doctrine of Descent and Darwinism," published in the "International Scientific Series," by Kegan Paul, Trench & Co. (2) There is no such a thing as a cheap scientific dictionary, (3) nor does such a pamphlet on engineering as you ask for exist. (4) The volumes of the "Chandos Classics," published by F. Warne & Co., contain editions of the poets suitable to your wants. (5) This question is simply an impertinence. What business have you, or any one else, to inquire into the editorial arrangements of this journal?—F. W. H. DOYLE. (1) The orbits of the planets are by no means accurately in the same plane. That of Mercury is inclined 7° to the ecliptic or plane of the earth's orbit; Venus's 3°; Saturn's, 2½°, &c.; while among the planetoids the inclination of Pallas's orbit is nearly 35°. If, though, as is supposed, the whole solar system had a common nebulous origin, its components would naturally be spread out approximately in the plane of the equator of the original rotating vaporous mass. (2) The path of any body describing an orbit—or even passing only once round the sun—depends upon the direction in space from which it approaches him. (3) From the elementary principle that "action and reaction are equal and opposite." The air rushing out drives back the vessel containing it precisely with the force with which it does so issue, and as that vessel is, necessarily, attached to your hypothetical ship, it is not hard to see why the latter remains unaffected. Did you ever try to lift yourself by the waistband of your own trousers?—E. C. H. If you were standing at either flank of a company of soldiers firing, of course not a bullet would go near you. If you, however, stood straight in front of the file which happened to be shooting, the passage of one or two 455 bullets through your person would indicate with sufficient clearness what was going on. To be consistent, though, you ought to maintain that under the former circumstances there was no firing at all!

Our Inventors' Column.

We give here, week by week, a terse description of such of the many inventions as we think may be of use to our readers. Where it is possible, the number of the patent is quoted, to enable those who desire fuller information to procure the specification from the Patent Office in Cursitor-street, Chancery-lane. We shall, generally speaking, confine ourselves to the more recent inventions; but it often happens that an article comes under our notice which, although not quite novel, is worthy of mention for its utility and ingenuity. In such a case we should not hesitate to refer our readers to it. And while we thus increase the interest of our pages, we at the same time assist the inventors by giving greater publicity to their inventions (KNOWLEDGE being a popular magazine) than is accorded by the most excellent trade journals.

COFFEE MACHINE.

[Patent No. 11,728. 1884.]—This invention of Mr. L. Hamel, 42, Basinghall-street, E.C., is a contrivance for simultaneously roasting, grinding, and infusing coffee in one machine, and by these means combining all the necessary materials for making the freshest coffee, retaining its aroma, and effectually preventing any adulteration.

Fig. 1.

Fig. 2.

The machine (Fig. 1) consists of a coffee-pot on a stand, upon which, and beneath the coffee-pot, a coffee-roaster (Fig. 3) revolves in various directions by a novel eccentric motion, upwards, downwards, and from side to side, and to which roaster a coffee-mill is attached. The lamp or burner beneath it boils the necessary water for infusion, and at the same time roasts the berries which, as soon as roasted, are automatically emptied into a hopper, where it is ground by the mill attached to the roaster. Thus the whole process of roasting the green coffee-berries, grinding, and infusing the same is simultaneously performed within about fifteen minutes.

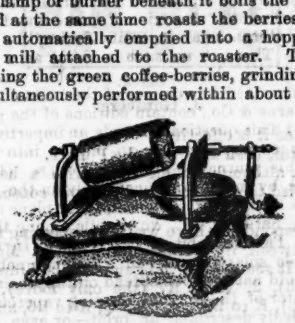


Fig 3.

The coffee-pot is so arranged that, if required, it may be easily removed from its stand. The stand, also, when the coffee-pot is removed, will roast and grind the coffee simultaneously, and the ground coffee might then be used for any other pot. Either a gas-burner (where this is convenient) may be used, or a spirit-lamp; those in use by the inventor are of a peculiar construction, for whilst the gas-burner may be so regulated as to heat the roaster and boiler, either together or separately, the spirit-lamp, by a simple contrivance, may be regulated in every necessary direction, and will automatically be extinguished under the roaster when the berries are roasted, whilst it still keeps the water boiling, and will also automatically be totally extinguished when the infusion is completed. The machine is exhibited in the Inventions Exhibition.

Our Chess Column.

By MEPHISTO.

BRITISH CHESS ASSOCIATION.

ON Friday last the series of consultation games between five sets of players commenced. There are three prizes, of £5, £3, and £2. Each set plays with the other, therefore each party will have to play three games. The following are the names of the consulting players, each set, according to the conditions, consisting of a first-class player and an amateur:—

Gunsberg and Hunter,	Mason and Donnisthorpe,
Bird and Hewitt,	MacDonnell and Pollock.

Mason and Donnisthorpe adopted the French defence against Bird and Hewitt, and succeeded in gaining a Pawn in the opening. The end-game increased their advantage, and they won.

Gunsberg and Hunter played the centre gambit against MacDonnell and Pollock. This game soon assumed an open and interesting character, as may be seen from the opening moves given here:—

White. G. and H.	Black. McD. and P.	White. G. and H.	Black. McD. and P.
1. P to K4	P to K4	10. Kt to B4	P to Kt4
2. P to Q4	P × P	11. B to K3	Q to Kt3
3. Q × P	Kt to QB3	12. Castles	Q × P
4. Q to K3	B to Kt5 (ch)	13. B × B	RP × B
5. P to B3	B to R4	14. Q × QP	B to B4
6. Q to Kt3	Q to B3	15. Q to K5 (ch)	Q × Q
7. B to KB4	P to Q3	16. Kt × Q	R × P
8. B to QKt 5	B to Kt3	17. Kt × Kt	P × Kt
9. Kt to Q2	P to KR3	18. B × P (ch)	K to Bsq

The game extended to seventy moves, and was not finished till Saturday. White in the end game remained with a Kt against a B and a passed P on the KR file, and ultimately won.

An interesting event—the Solution Tourney—was decided on Saturday. The Problems, a four-mover and a three-mover, given below, were submitted on printed diagrams to the competitors, who had to solve them without the use of board and men. Mr. Gunsberg was the first to hand in complete solution of the four-mover, and he therefore took first prize of two guineas; Mr. Bird took the second prize. Mr. Herbert Jacobs took the prize for the best and most rapid solution of the three-mover. Monday, the 29th ult., the chief event of the Tournament was decided. Gunsberg defeated MacDonnell in the game given herewith. He next played Mills, but through an oversight in the ending the latter was enabled to draw. However, Hewitt drew with Bird at the same time, which again brought the score of the leading players to their former relative position, namely, Bird, 10½ out of 13 games played, Gunsberg, 12 out of 13, Gunsberg needing but one more game to win, as Bird's highest possible would be 12½. Guest, late in the evening, made up the deficiency by losing the adjourned ending to Gunsberg, who, therefore, with a score of 13 out of 14, has practically secured, the first prize. He may, however, still increase his score by another win.

SOLUTION TOURNEYS.

Motto—"Sat Sapienti."

(From the "CHESS-MONTHLY" Problem Tournament.")

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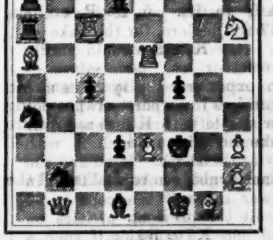


WHITE.

White to play and mate in four moves.

BLACK.

WHITE.

White to play and mate in three moves.

Another consultation game was played on Monday, in which Mason and Donnisthorpe were opposed to MacDonnell and Pollock, who won the toss for the move. The former players again adopted

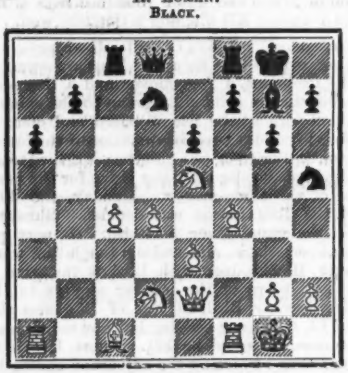
the French Defence, the game proceeding evenly, till, in the middle part of the game, MacDonnell and Pollock exposed their King's side by an advance of the KKtP. Mason took advantage of this weakness with his well-known judgment and ability, and again came off victorious. Gunsberg and Hunter began a game against Bird and Hewitt on Saturday. The former players got a disadvantage in the developing moves of the French Defence, but the game had to be adjourned. The game was finished on Tuesday, and Bird and his partner won.

Complete score of the B. C. A. Tournament up to Tuesday eleven o'clock p.m., inclusive:—

——	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Total.
H. E. Bird (A)	—	1	0		½	1	½	1	½	1	1	1	1	1	1	1	11½
W. Donisthorpe (B)	0	—	0	0	0	1	1	1	0	1	1	1	1	1	0	0	8
J. Gunsberg (C) ...	1	1	—	1	1	½	1	1		1	1	1	1	1	½	1	13
A. Guest (D)		1	0	—		1			1	1	½		0	1	1		6½
Thos. Hewit (E) ...	½	1	0		—	0	0	1		1	0	½		1	0	1	6
D. Y. Mills (F)	0	0	½	0	1	—	0	0	0	1	0	1	½	1	½	0	5½
Rev. McDonnell (G)	½	0	0		1	0	—	0	1	1	1	1	1	½	1	1	10
J. Mortimer (H) ...	0	0	0		0	1	1	—	½	1	0	1		0	0	1	5½
R. Loman (I)	½	1		0		1	0	½	—		0	1	1	1	1	1	8
W. Mackeson (J) ...	0	0	0	0	0	0	0	0		—	0	0		½	0	0	½
W. H. K. Pollock (K)	0	0	0	½	1	1	0	1	1	1	—	1		1	1	1	9½
R. Rabson (L)	0	0	0		½	0	0	0	0	1	0	—	0	0	0	0	1½
H. A. Reeves (M)...	0	0	0	1		½	0		0			1	—	1	0	1	4½
Rev. J. de Soyres (N)	0	0	0	0	0	0	½	1	0	½	0	1	0	—	0	1	4
G. E. Wainwright (O)	0	1	½	0	1	½	0	1	0	1	0	1	1	1	—	1	9
A. Rumboll (P)	0	1	0		0	1	0	0	0	1	0	0	0	0	0	—	3

POSITION in a game played June 27, between Messrs. MacDonnell and Loman:— R. LOMAN.

BLACK.



WHITE.

G. R. MACDONNELL.

White won the game in sixteen moves in the following forcible manner:—

1.	P to Kt4	B × Kt
2.	BP × B	Kt to Kt2
3.	B to R3	

Well played! Black must either lose the exchange or submit to White's next move.

3.		R to K sq.
4.	Q to B2	Kt to Kt3

Black has no good reply. If 4. P to B4. 5. P × P en pas, threatening the Kt and also P to B7 (ch).

5.	Q × P (ch)	K to R sq.
6.	P to R3	

One of those moves with which experienced players wait on youngsters. It serves the (ostentatious) purpose of providing against a possible excursion of her majesty to Kt4 at any future time, but it also invites Black to take the bait on B4.

6.		Kt × P

The sprat has been swallowed. Black ought to have challenged the Queen.

7.	Kt × Kt	R × Kt
8.	B to K7!	Q to B sq.
9.	B to B8!	Kt to B4
10.	R × Kt!	

It may now be seen that White's 8th move was necessary to enable him to get the check on B6.

10.		R to B8 (ch)
11.	R × R	Q × R (ch)
12.	K to Kt2	Q to B7 (ch)
13.	K to Kt3 and mate in three moves.	

The following game was played June 29th in the Tournament:—

IRREGULAR OPENING.

White. Rev. G. A. MacDonnell.	Black. J. Gunsberg.	White. Rev. G. A. MacDonnell.	Black. J. Gunsberg.
1. P to KB4	P to Q4	15. B to K sq.	Q to Kt4
2. P to K3	P to QB4	16. K to B2 (*h*)	Kt × KP (*i*)
3. Kt to KB3	P to K3	17. P × Kt	P to Q5 (*j*)
4. B to K2	B to K2	18. P × P (*k*)	Kt × B
5. Castles	B to B3 (*a*)	19. P to Q5	Kt × RP
6. P to Q4	P to B5 (*b*)	20. R to KKt sq.	Q to B5 (ch)
7. Kt to B3 (*c*)	Kt to B3	21. K to Kt2	Kt × P
8. Kt to K5 (*d*)	KKt to K2	22. K to R3	Q to R7 (ch)
9. P to KKt4 (*e*)	B × Kt	23. K × Kt	Q × R (ch)
10. BP × B	P to QR3	24. K to B4	P to Kt4 (ch)
11. B to Q2	P to QKt4	25. K to B3	P × P
12. P to QR3 (*f*)	B to Kt2	26. B to B2	P to Q5 (ch)
13. B to B3	Kt to Kt3	27. Kt to K4	B × Kt (ch)
14. P to Kt3 (*g*)	Kt to R5	28. K × B	Q × B
		Resigns	

NOTES.

(*a*) Any developing move would be more in conformity with the defence in close games.

(*b*) Owing to his previous move, Black is now committed to advance this Pawn.

(*c*) White should have proceeded immediately to break the adverse Pawns, with 7. P to QKt3. If 7. .....P to Kt 4, then 8. P to QR4. If 7. .....P × P, then 8. RP × P, with an open Rook's file and united Pawns.

(*d*) 8. P to QKt3 would still be advantageous.

(*e*) Undoubtedly the cause of White's subsequent troubles.

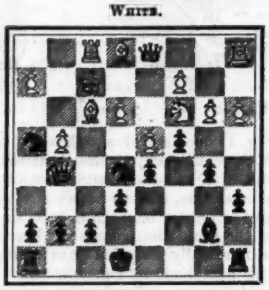
(*f*) To prevent 12. .....P to Kt5; but the remedy is worse than the evil. The simple way would have been 12. B to B3, followed by 13. Kt to K2, &c.

(*g*) The game being once compromised on the Queen's side, and an attack threatened on the King's wing as well, White ought to have devoted his attention to the more important defence of the King's position.

(*h*) 16. Q to K2 was preferable.

G. A. MacDonnell.

WHITE.



BLACK.

J. Gunsberg.

(*i*) As sound as it is effective.

(*j*) If 13. B × B, then 18. .....Q × P mate.

(*k*) 18. Q × P, although leaving Black with a better game, still would not have led to such sudden disastrous consequences.

SEVERAL correspondents have written respecting the termination of the game between W. Donnisthorpe and J. Mortimer, KNOWLEDGE, p. 558. It seems that the game can be drawn as follows:— 1. Kt to Q7 (ch), 2. K to R7 (the only move), P to R8 (Q). 3. Kt to Kt3 (ch), K to B5. 4. Kt × Q, K to B6, and draws.

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